What is claimed is:

1. A method for recovering Al containing vapor species from an off-gas produced in at least one smelter during carbothermic reduction of alumina to form aluminum, where the off-gas comprises CO, Al vapor and aluminum suboxide, comprising:

(a) directing the said off-gas to an enclosed reactor;

(b) supplying wood charcoal having a porosity of from about 50 vol.% to 85 vol.%, and a bulk density of from about 0.4 g/cm^3 to 0.7 g/cm^3, to the enclosed reactor; and

(c) contacting the wood charcoal with the off-gas to produce a product comprising Al_4C_3.

2. The method of Claim 1, wherein the wood-charcoal has an average pore diameter of from about 0.05 μm to about 2.00 μm.

3. The method of Claim 1, wherein the wood-charcoal has a porosity in terms of mm^3/g specific pore volume vs μm pore diameter selected from area A of Fig. 4.

4. The method of Claim 1, wherein the wood-charcoal is Eucalyptus wood-charcoal.

5. The method of Claim 1, wherein the wood-charcoal is Eucalyptus Camalduensis.

6. The method of Claim 1, where, in step (c) there is a diffusion of a portion of the formed Al_4C_3 into the microstructure, impregnating a portion of the pores without forming a dense covering slag top layer.

7. The method of Claim 1, wherein the wood charcoal has an ash content of from about 2% to 4%, based on weight of fixed carbon in the wood charcoal.

8. The method of Claim 1, wherein the wood charcoal has a large number of interconnected pores.

9. The method of Claim 1, wherein the enclosed reactor is a counter-current moving bed reactor.

10. The method of Claim 1, wherein the enclosed reactor is at least one fluid bed reactor.

11. The method of Claim 1, wherein the wood charcoal in step (c) produces at least an 85% conversion of the carbon in the wood charcoal to carbide as Al_4C_3.

12. The method of Claim 1, where the Al_4C_3 formed in step (c) is passed back to the at least one smelter for further carbothermic reduction.